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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/679,687	10/05/2000	Stephen M. Allen	BB1162 US NA	1467

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EXAMINER
WEGERT, SANDRA L

ART UNIT	PAPER NUMBER
1647	13

DATE MAILED: 04/21/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/679,687	ALLEN ET AL.	
	Examiner	Art Unit	
	Sandra Wegert	1647	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 February 2003* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *25-34* is/are pending in the application.

4a) Of the above claim(s) *31 and 33* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *25-30,32 and 34* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☒ Claim(s) *25-34* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 October 2000* is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 7 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Status of Application, Amendments, and/or Claims

Applicant's election without traverse of Invention I (claims 11-15, 20-21 and 23-24) in Paper No. 12 (11 February 2003) is acknowledged. In addition, Applicant elected the following Group: SEQ ID NO: 1. In Paper 12, Claims 11-24 were cancelled by the Applicant and Claims 25-34 were added. Claims 31 and 33 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected Invention (Invention III, Paper 10), there being no allowable generic or linking claim.

Claims 25-30, 32 and 34 are under examination in the current application.

Informalities

Specification

The disclosure is objected to because of the following informalities:

Title

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed. The following title is suggested: "NUCLEIC ACID MOLECULES ENCODING SUCROSE TRANSPORTERS".

Appropriate correction is required.

Claim Rejections/Objections

Claim Rejections - 35 USC § 101 and 35 USC § 112, first paragraph

The following is a quotation of 35 U.S.C. 101:

> **Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.**

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> **The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.**

Claims 25-30, 32 and 34 are rejected under 35 U.S.C. 101 because the claimed invention lacks a credible, specific and substantial asserted utility or a well-established utility.

The claims are directed to the polynucleotide of SEQ ID NO: 1, recombinant expression of the peptide encoded by SEQ ID NO: 1, sequences that are 90-95% similar to SEQ ID NO: 1, and recombinant expression of SEQ ID NO: 2.

No well-established utility exists for newly-isolated complex biological molecules. However, the specification asserts or implies the following as credible, specific and substantial patentable utilities for the disclosed polypeptide and the claimed polynucleotides and recombinant methods used to express it:

1) To produce a variant or chimeric nucleotide or polypeptide,

2) To make hybridization probes and primers to detect nucleic acid molecules that encode the polypeptide of SEQ ID NO: 2,

3) In the creation of transgenic organisms,

4) To detect homologs in other species,

5) For gene therapy.

Each of these shall be addressed in turn:

1) To produce a variant or chimeric nucleotide or polypeptide. This asserted utility is credible but not substantial or specific. Such assays can be performed with any polynucleotide. Further, the specification discloses nothing specific or substantial for the variant nucleotide and polypeptide that are produced by this method. Since this asserted utility is not present in mature form, so that it could be readily used in a real world sense, the asserted utility is not substantial.

2) To make hybridization probes and primers to detect nucleic acid molecules that encode the polypeptide of SEQ ID NO: 2. This asserted utility is credible but not substantial or specific. Hybridization probes and primers can be designed from any polynucleotide sequence. Further, the specification does not disclose specific cDNA, DNA, or RNA targets. Since this asserted utility is also not present in mature form, so that it could be readily used in a real world sense, the asserted utility is not substantial.

3) In the creation of transgenic organisms. This asserted utility is credible but not specific or substantial. The specification discloses nothing about whether the claimed gene will be "knocked in" or "knocked out" or what specific tissues and cells are being targeted. Since

this asserted utility is also not present in mature form, so that it could be readily used in a real world sense, the asserted utility is not substantial.

4) To detect homologs in other species. This asserted utility may be credible, however it is neither specific nor substantial. Applicants have not demonstrated the function of the polypeptide encoded by the claimed polynucleotide, much less relevant homologs. Thus, the asserted utility is not substantial. Finally, many unrelated sequences can be homologous, generally. Thus, the asserted utility is not specific.

6) For gene therapy. This asserted utility is credible but not specific or substantial. Such can be performed for any polynucleotide. Further, the specification does not disclose conditions associated with a mutated, deleted, or translocated gene of the claimed invention. Significant further experimentation would be required of the skilled artisan to identify organisms with such a condition and to determine the route of administration of the gene, as well as quantity and duration of treatment. Since this asserted utility is also not presented in mature form, so that it could be readily used in a real world sense, the asserted utility is not substantial.

Furthermore, the specification asserts that the claimed polynucleotide encodes a sucrose transporter protein based on homology to known transporters. This assertion cannot be accepted as credible in the absence of supporting evidence of specific function, because the art shows that structurally similar transporters are unpredictably functionally dissimilar. For example, relevant literature reports that sugar transporters constitute a diverse class of enzymes with respect to kinetic properties, regulation, pharmacology, and structure (see, for example: Bisson, et al, 1993, Crit. Rev. Biochem. Mol. Biol. 28 (4): 259-308). Sugar transporters are involved in

the control of a variety of significant physiological functions, including feeding, excretion, and reuptake of critical small molecules.

Although transporter family members share several common structural features, relevant art (Bisson, et al, 1993, Crit. Rev. Biochem. Mol. Biol. 28 (4): 259-308) shows that members of a class do not always share a specific and substantial functional attribute or utility, despite having structural features in common. Mutations in transporters serve to illustrate this fact, since a single amino acid substitution can change the substrate specificity of a transporter or inactivate it. For example, several single amino acid substitutions in a yeast glucose transporter can change substrate specificity (Liang, H., et al (1998) Mol. Cell. Biol. 18(2): 926). Similarly, point mutations in a nucleoside transporter have been shown to alter substrate specificity such that the mutant transporter bears similarity to P-glycoprotein or the Multi-drug Resistance transporter (Vasudevan, et al (2001) Mol. PNAS 98(11): 6092-6097). Therefore, membership in a class of transporters may not impart a specific, substantial, and credible utility to a new member, such as the claimed polynucleotide of the Instant Application.

Claims 25-30, 32 and 34 are also rejected under 35 U.S.C. 112, first paragraph. Specifically, since the claimed invention is not supported by either a specific and substantial asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention. In addition, even if a utility for the claimed invention were established, the invention may not be enabled, for the reasons discussed above.

Furthermore, regarding Claims 25(a) and 26, the specification does not enable variants of SEQ ID NO: 2. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with the claims.

The claims are directed to the polypeptide and variants of SEQ ID NO: 2. Claims 25(a) and 26 read on peptides that are at least 90% identical to SEQ ID NO: 2. The scope of the patent protection sought by the Applicant as defined by the claim fails to correlate reasonably with the scope of enabling disclosure set forth in the specification for the following reasons:

The Instant Application does not reasonably provide enablement for various protein forms of SEQ ID NO: 2, wherein the protein's sequence is at least 90% identical to the amino acid sequence of the protein of SEQ ID NO: 2. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. Specifically, since the claimed invention is not supported by either a specific asserted utility or a well established utility for the reasons set forth above, one skilled in the art clearly would not know how to use the claimed invention, nor its variants.

Claims 25(a) and 26 are directed to a polypeptide that is at least 90% identical to that in SEQ ID NO: 2. The specification discloses a transporter-like polypeptide having an amino acid sequence shown in SEQ ID NO: 2. The specification is not enabled for the full scope of the protein, wherein the encoded amino acid sequence is at least 90% identical to SEQ ID NO: 2, with the assurance that enabled proteins can be made without undue experimentation and with the assurance that they would have the desired properties. There are no examples of what

specific polypeptides fall within the range of those that would be at least 90% identical. Neither is it clear if this percent identity need be over a contiguous region or a specific portion of the protein.

Similarly, Claims 25(a) and 26 read on variants of SEQ ID NO: 2. However, the specific activities of the claimed proteins are not disclosed. Nor is there disclosed assays to test for these activities. There is no discussion or working examples, disclosed in the instant case, as to what amino acids are necessary to maintain the functional characteristics of the polypeptides as claimed. Claims 25(a) and 26 encompass numerous undefined variants of SEQ ID NO: 2. However, as discussed above, it is not predictable as to which amino acids are necessary to maintain the functional characteristics of a protein.

In In re Wands, 8USPQ2d, 1400 (CAFC 1988) page 1404, the factors to be considered in determining whether a disclosure would require undue experimentation include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

Due to the large quantity of experimentation required to determine how to use all variants of SEQ ID NO: 2, the lack of direction or guidance in the specification regarding same - e.g., the lack of guidance regarding specific activity of SEQ ID NO: 2, or at least 90% identical-, the lack of working examples to all variants of SEQ ID NO: 2, the state of the art showing the unpredictability of function based on structural similarity of transporter polypeptides, and the breadth of the claims which embrace innumerable variants of SEQ ID NO: 2, undue

experimentation would be required of the skilled artisan to make and use the claimed invention in its full scope

Furthermore, Claim 34 is rejected under 35 U.S.C. 112, first paragraph, because the specification is not enabling for the limitations of the claims wherein a DNA is incorporated into the genome of a multicellular organism in the manner claimed.

The present application is enabling for recombinantly expressing the transporter protein in several *cell* types. The specification is not enabling for the limitations of the claims wherein a multicellular organism (e.g. an animal or plant) is produced that comprises the DNA encoding SEQ ID NO: 2. The specification does not disclose details and examples of how the polynucleotide encoding a functional sucrose transporter will be incorporated into the genome of a multicellular organism and tested for function.

In In re Wands, 8USPQ2d, 1400 (CAFC 1988) page 1404, the factors to be considered in determining whether a disclosure would require undue experimentation include (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

The specification also discloses the polynucleotide of SEQ ID NO: 1 used to make the sucrose transporter of SEQ ID NO: 2. However, Claim 34 recites a transgenic plant comprising the gene for the sucrose transporter of SEQ ID NO: 2. There is no discussion or working

examples disclosed in the instant application whereby a multicellular plant with the claimed incorporated gene(s) is demonstrated to express the sucrose transporter polypeptide.

Due to the large quantity of experimentation required to determine how to make a transgenic plant comprising a functional SEQ ID NO: 2, the lack of direction or guidance in the specification regarding the same, the lack of working examples to transgenic plants, the state of the art showing the unpredictability of making "knock-in" transgenic multicellular organisms, and the breadth of the claim, --undue experimentation would be required of the skilled artisan to make and use the claimed invention in its full scope.

35 USC § 112, first paragraph – Written Description.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> **The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.**

Claim 34 is rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 34 is directed to a multicellular organism comprising the polynucleotide of SEQ ID NO: 1.

The specification as originally filed does not provide adequate written description for a multicellular organism comprising the polynucleotide of SEQ ID NO: 1. The exact description

of the organism is not expressly asserted nor do they flow naturally from the specification as originally presented.

Vas-Cath Inc. v. Mahurkar, 19USPQ2d 1111, clearly states that "applicant must convey with reasonable clarity to those skilled in the art that, as of the filing date sought, he or she was in possession *of the invention*. The invention is, for purposes of the 'written description' inquiry, *whatever is now claimed"* (See page 1117). The specification does not "clearly allow persons of ordinary skill in the art to recognize that [he or she] invented what is claimed" (See *Vas-Cath* at page 1116).

The specification as originally filed does not provide adequate written description of the subgenus now claimed. The specification teaches a polynucleotide of SEQ ID NO: 1. Furthermore, it is reasonable to expect success in transfecting the polynucleotide of SEQ ID NO: 1 into single cells. However, the specification does not provide adequate support for a multicellular organism comprising the polynucleotide of SEQ ID NO: 1.

Therefore, only a vector or single cell comprising the polynucleotide of SEQ ID NO: 1, but not the full breadth of the claim, meets the written description provision of 35 U.S.C. §112, first paragraph. Applicant is reminded that *Vas-Cath* makes clear that the written description provision of 35 U.S.C. §112 is severable from its enablement provision (see page 1115).

Conclusion: Claims 25-30, 32 and 34 are rejected for the reasons listed above.

Advisory Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sandra Wegert whose telephone number is (703) 308-9346. The examiner can normally be reached Monday - Friday from 9:30 AM to 6:00 PM (Eastern Time). If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Gary Kunz, can be reached at (703) 308-4623.

Official papers filed by fax should be directed to (703) 308-4242. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0196.

SLW

4/16/03

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